8/E

NUMBER 16

Proceedings

COMMONWEALTH MYCOLOGICAL INSTITUTE
8 FEB 1949

of

The Canadian Phytopathological Society

Fifteenth Session

June 21-24, 1948.

GUELPH
Ont.

Issued January 19, 1949

Editorial Committee
B. J. SALLANS
R. C. RUSSELL
D. B. O. SAVILE

NUMBER 16

Proceedings

of

The Canadian Phytopathological Society

Fifteenth Session

June 21-24, 1948.

GUELPH

Ont.

Editorial Committee

B. J. SALLANS
R. C. RUSSELL
D. B. O. SAVILE

The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1947-1948

President

R. R. HURST, Dominion Laboratory of Plant Pathology, Charlottetown, P. E. I.

Vice-President

A. W. HENRY University of Alberta, Edmonton, Alta.

Secretary-Treasurer

L. T. RICHARDSON, Division of Botany and Plant Pathology, C.E.F., Ottawa

Councillors

T. JOHNSON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.
J. E. JACQUES, Montreal Botanical Garden, Montreal, P.Q.

Etienne Foëx

1876-1944

We have only recently learned of the death on October 29, 1944, of one of our honorary members, Dr. Etienne Foëx, noted French plant pathologist.

Dr. Foëx was born at Montpellier, France, on June 18, 1876. He received his education at the University of Montpellier and the Sorbonne, and in 1903 was appointed to the staff of l'Ecole Nationale d'Agriculture at Montpellier. From 1912 until his death he was associated with the Station de Pathologie Végétale at Versailles, as director from 1915 to 1939, and subsequently as honorary director. A lieutenant with the Chasseurs Alpins in World War I, he was wounded and taken prisoner.

Dr. Foëx's early research on the fungi causing powdery mildews contributed greatly to our knowledge of the life history of these organisms. His later research concerned cereal rusts, smut, bunt and take-all of wheat, and diseases of potato and tobacco. The work of Dr. Foëx and his colleagues on virus diseases of potatoes (known at the time as "degeneration") was of great value in controlling these diseases in France. Dr Foëx received two awards from l'Académie des Sciences for his research.

In recognition of his contributions to plant pathology, Dr. Foëx was elected to honorary membership in the Canadian Phytopathological Society at the 1933 annual meeting held at Regina, Sask. The plant pathologists of Canada now pay tribute to the memory of a great scientist and extend to their fellow workers in France sincere sympathy in the loss of their leader.

MINUTES OF THE FIFTEENTH ANNUAL MEETING HELD AT GUELPH, ONTARIO JUNE 23 TO 26, 1948

Business Session: June 21, 7.30 p.m.

The meeting was called to order by the President, R. R. Hurst, at 7.30 p.m. June 21. Twenty-three members of the Society were in attendance. In his opening remarks the President express satisfaction with the recent growth of the Society and confidence in its future. He stressed the value of regional groups in maintaining the interest of the membership and expressed his appreciation of the work of the various Committees and of the Secretary-Treasurer. He welcomed Dr. R. O. Lachance, the official delegate of the Quebec Society for the Protection of Plants, who spoke briefly in reply, conveying the greetings and good wishes from that Society. The President then expressed on behalf of the members regret that Professor J. E. Howitt was unable to be present on account of illness. He congratulated Dr. J. G. Coulson who was recently honoured with the D.Sc. degree by the University of Montreal.

The minutes of the previous meeting having been published and distributed to all members in Proceedings No. 15, they were adopted without being read on a motion by L. T. Richardson and R. O. Lachance. It was decided to defer discussion of business arising out of the minutes until the other business had been dealt with.

The report of the Secretary-Treasurer was read and adopted on a motion by L. T. Richardson seconded by D. B. O. Savile.

The report of the Nominating Committee, read by J. F. Hockey, was adopted on the motion of J. F. Hockey and W. C. Broadfoot.

In the absence of T. Johnson, the Secretary read the report of the Custodian of the Library and Records. The value of maintaining the library was questioned and the Secretary was instructed to secure further information from Dr. Johnson as to its extent and the use being made of it by the membership. It was suggested that if it were not being used and if its upkeep involved much work on the part of the Custodian, the Society might consider donating the publications on hand to a government library or other institution. The report was adopted on a motion by L. T. Richardson and J. D. McLachlan.

The report of the Editorial Committee, read by D. B. O. Savile, was adopted on the motion of D. B. O. Savile and D. J. MacLeod.

The following committees were formed:

Publicity: J. D. MacLachlan and L. T. Richardson.
Resolutions: J. F. Hockey, B. Peturson and A. R. Walker.
Nominating: R. R. Hurst, T. Johnson, R. E. Fitzpatrick, D. L. Bailey and J. C. Perrault.
Editorial: B. J. Sallans, R. C. Russell and D. B. O. Savile.
Auditors: Mildred K. Nobles and J. W. Groves.

It was moved by W. C. Broadfoot and seconded by J. F. Hockey than an honorarium of twenty dollars be voted for stenographic assistance to the Secretary-Treasurer for the past year. Carried.

Two changes were made in the distribution of territory amongst the Regional Groups. It was moved by L. T. Richardson and seconded by D. J. MacLeod that two groups be established in British Columbia in place of one: B. C. Mainland and Vancouver Island. Carried. It was moved by J. F. Hockey and seconded by R. S. Willison that the Nova Scotia, Prince Edward Island, and New Brunswick Groups be merged to form one Maritime Regional Group. Carried.

The following were appointed as Regional Representatives for 1948-49:

D. J. MacLeod	Maritime Provinces
R. O. Lachance	Eastern Quebec
J. E. Jacques	Western Quebec
Mildred K. Nobles	Eastern Ontario
A. A. Hildebrand	Western Ontario
W. J. Cherewick	Manitoba
B. J. Sallans	Saskatchewan
L. E. Tyner	Alberta
R. E. Fitzpatrick	B.C. Mainland
W. Jones	Vancouver Island

Applications for membership were received from the following: W. A. Hodgson, G. H. S. Malcolmson, J. W. Merryfield, H. S. MacLeod, H. Crockard, N. Mayers, H. F. Olds, D. M. MacLeod, R. H. Stover, Constance, G. McKeen, G. J. Green, Ruth M. Horner, R. J. Baylis, S. G. Fushtey, R. Desmarteau, L. Cinq-Mars, E. Lavallée, S. A. Simmons, L. V. Busch, D. M. Sutton, A. Mavis Leach and F. North. It was moved by L. T. Richardson and seconded by D. J. MacLeod that these be officially admitted into the Society. Carried.

The President announced that the Council unanimously recommended that Honorary Memberships be conferred upon the following in recognition of their outstanding contributions to Canadian plant pathology: Dr. Margaret Newton, recently retired from the Winnipeg Rust Research Laboratory; John William Eastham, former Provincial Plant Pathologist for British Columbia; and Professor John Eaton Howitt, Head of the Botany Department, Ontario Agricultural College. The Secretary read a brief biography of each of the nominees. It was moved by R. S. Willison, and seconded by D. B. O. Savile, that Honorary Memberships be granted to Dr. Newton, Mr. Eastham, and Professor Howitt. Carried unanimously.

One item of business arising out of the minutes was the status of the C.P.S. in relation to the Agricultural Institute of Canda. The Secretary reported that the resolution on this subject passed at the last annual meeting had been forwarded to the A.I.C. Secretary. A special committee was set up by the A.I.C. to study the question of subject groups and affiliated societies. On the recommendation of this committee, a motion was being placed before the A.I.C. meeting to change the bylaw on affiliation so as to reduce the number of members of an affiliated society required to be members of the Institute to 60% of the voting members of the affiliated society resident in Canada. The Secretary stated that he believed that the Canadian Phytopathological Society could qualify for affiliation under the revised by-law, and that he would ascertain the actual number of A.I.C. members in our Society.

Another item of business arising out of the minutes was the question of organization of Canadian microbiology. The Secretary reported that copies of the Ledingham report, presented at the last annual meeting, had been sent to all Regional Groups. He read a summary of the views expressed by the various Groups following their discussions of the question. He also read a report from the Western Quebec Regional group which concluded with the following resolution, moved by R. A. Ludwig and seconded by J. E. Jacques:

"*Whereas* the Canadian Phytopathological Society in its present form is unable, for geographic and other reasons, to adequately serve the needs of Canadian plant pathologists; *whereas* neither the formation of a subject section of the Agricultural Institute of Canada nor the formation of a Canadian Microbiological Society would meet these needs; and *whereas* more benefit would be derived from association with the large body of American plant pathologists; *be it resolved* that the necessary steps be taken to renew association with the American Phytopathological Society as a Canadian Section of that organization."

Following a lengthy discussion, this motion was defeated by a vote of 1 to 22. It was also considered inadvisable to broaden the scope of the Society to take in the miscellaneous groups of microbiologists who have no organizaton at the present time. It was felt that if a Microbiological Council were formed that these groups would be encouraged to organize so that they could have representation on it. It was moved by D. L. Bailey and seconded by D. J. McLeod: "That this

meeting approves the formation of a Canadian Microbiological Council and recommends that the Executive take appropriate action towards the establishment of such a Council." Carried unanimously.

RESOLUTIONS

Whereas the members of the Canadian Phytopathological Society, on the occasion of the annual convention of the Agricultural Institute of Canada, June 21-24, 1948, have enjoyed excellent facilities and many courtesies;

Be it resolved that we extend our sincere gratitude to:

1. Our hosts at the Ontario Agricultural College and the O.A.C. Branch of the Agricultural Institute of Canada.

2. The members of the staff of the Botany Department of the Ontario Agricultural College.

3. The National Film Board for the showing of the film "The Dutch Elm Disease."

PROGRAMME

Three sessions were held for the presentation of scientific papers, abstracts of which are published in this issue of the Proceedings. All meetings were well attended and many visitors were present.

In the morning of June 22, when papers on forest pathology and cereal diseases were presented, Dr. W. C. Broadfoot presided as chairman. A short film in colour illustrating the Dutch Elm Disease was shown through the courtesy of the National Film Board.

Dr. J. D. MacLachlan presided in the morning of June 23 when a symposium on the epidemiology of plant diseases was held. He also led a discussion of the late blight warning service.

Papers on miscellaneous topics were presented at the final session in the afternoon of June 23, when Dr. L. W. Koch presided. At the conclusion of this session, Mr. Hurst turned the office of President over to Dr. A. W. Henry who made a few appropriate remarks before adjourning this fifteenth annual meeting of the Society.

REPORT OF THE NOMINATING COMMITTEE FOR 1948

The chairman of the Nominating Committee contacted the other members of this committee in February concerning the nomination of officers for the year 1948-49. The committee agreed unanimously on the following slate of officers, which was submitted to the Secretary-Treasurer on March 3:

President — A. W. Henry
Vice-President — D. J. MacLeod
Councillor — Fernand Godbout

The above slate of officers was subsequently submitted to the membership of the Society by the Secretary-Treasurer, but no further nominations were forthcoming.

Respectfully submitted by the Nominating Committee.

R. E. FITZPATRICK
R. O. LACHANCE
J. F. HOCKEY
L. W. KOCH
T. JOHNSON *(Chairman)*

REPORT OF THE EDITORIAL COMMITTEE

The Fifteenth Annual Proceedings of the Canadian Phytopathological Society reporting the Fourteenth Annual Meeting of the Society held at Lethbridge in June, 1947, appeared early in 1948. The committee appreciates the co-operation of all those who contributed reports or abstracts. The work of the Secretary-Treasurer in gathering the material for the Proceedings and in its publication

and distribution is worthy of particular commendation. The committee regrets that a list of publication by members of the Society for the period June 1, 1946, to May 31, 1947, was not prepared and included in these Proceedings. To collect the references and compile them would have delayed the issuance of the Proceedings, and since no specific directive had been given by the annual meeting it was decided to leave the matter for action at the 1948 meetings.

The following recommendations, the Committee feels, if implemented by the Annual Meeting, would clarify the position of the Editorial Committee with respect to the inclusion of a list of papers published in the Proceedings:

(a) That the 15th Annual Meeting instruct the Editorial Committee to include in the 16th Annual Proceedings a list of publications by the Society's members for the period June 1, 1946, to May 31, 1948.

(b) That a list of publications by members be given in each future Proceedings of the Society, such lists to cover the preceding Society year.

If such lists are to be published, the editorial committee suggests that the Secretary-Treasurer assemble the necessary information as soon as possible after the annual meeting. Regional representatives can aid greatly. The active and prompt co-operation of each member is essential to lighten the load on the Secretary-Treasurer.

It is further recommended, in order to facilitate the early appearance of the Proceedings, that the Secretary-Treasurer in giving notice of Annual Meetings request those who wish to present papers to submit short abstracts to the Secretary before or when the paper is read. Such abstracts should be set up: title in capital letters; triple space; name of author in capitals, followed by address in lower case; triple space; abstract, double spaced. Nothing should be underlined.

Respectfully submitted,

R. C. RUSSELL
D. B. O. SAVILE
B. J. SALLANS *(Chairman)*

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

During the past year the following publications have been received in exchange for Proceedings of our Society:

Proceedings of the Montana Academy of Sciences
Vols. 1-6
Boletim do Museu Nacional (Brazil)
Nos. 3-7
Yearbook of the Royal Veterinary and Agricultural College (Denmark)
1943-1947
Contributions de l'Institut d'Oka (La Trappe, Que.)
No. 1, 1948

A number of bulletins, reprints, and miscellaneous publications have been added to the library. The author index is being maintained for all scientific publications received.

T. JOHNSON.

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:—

I have the honour to present the following report of the Secretary-Treasurer for the year ending May 31, 1948.

The fourteenth annual meeting of the Canadian Phytopathological Society was held at Lethbridge, Alberta, June 23-26, 1947. Two important topics discussed at the business sessions were: affiliation with the Agricultural Institute of Canada and the organization of Canadian microbiology. An invitation paper entitled "Science in India" was presented by Dr. W. F. Hanna, Dominion Laboratory of Plant Pathology, Winnipeg, Manitoba. Dr. J. R. Boer, Tilgate Horticultural Experiment Station, Crawley, Sussex, England, presented a paper entitled "Seed Treatment Problems."

A symposium on smut diseases was held, and 14 other papers on a wide range of topics were presented. Abstracts of all papers were published in Proceedings No. 15 which were printed and distributed in January of this year.

The membership of the Society has increased from 110 to 139 in the past year. Much of the credit for this increase is due to the efforts of the Membership Committee comprised of all Regional Representatives under the able chairmanship of Walter Jones of Saanichton, B.C. Twenty-two applications for membership have been received and four former members have been re-instated. Seven names have been dropped from the roll, four voluntarily and three for non-payment of fees.

Some of the Regional Groups have been quite active this year, a few holding several meetings at which papers were read and discussed. It is believed that such regional meetings, in districts where the membership warrants them, will do more to hold the interest of the members than will the annual meetings that only a small portion of the membership can attend. One of the topics discussed by the regional groups this year was Dr. Ledingham's report on the question of organization of Canadian microbiology. As a result of these discussions, the present meeting should be in a better position to reach a decision than was the last annual meeting.

A slate of officers for 1948-49 was submitted to the Secretary by the Nominating Committee in March. No additional nominations being received from the membership, all offices were filled by acclamation and no election was necessary.

FINANCES

As the attached financial statement shows, the credit balance on May 31, 1948 was $169.86, more than double that of the previous year. In addition, we still hold a $500 Victory Bond drawing 3% interest. If the surplus continues to build up, as it should do with the increased membership, the Society will be in a position to consider extending its activities.

Respectfully submitted,

L. T. RICHARDSON.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY
June 1st, 1947 to May 31st, 1948

Revenue:			
Balance brought forward			$ 81.06
Fees:			
1947-48	$242.00		
1948-49	2.00		
		$244.00	
Interest on bond		15.00	
Sale of Proceedings		6.00	
		$265.00	$346.06
Expenditure:			
Honorarium to Miss S. M. Anderson		$ 20.00	
Printing of Proceedings No. 15		112.32	
Mimeographing		1.39	
Telegrams		2.39	
Stationery		20.55	
Postage		15.20	
Bank charges on current account		1.50	
Bank exchange on cheques		2.85	
		$176.20	
Balance (on hand) May 31st, 1948			$169.86
Additional Asset:			
Dominion of Canada 3% Victory Bond (Series K8Z32643)			$500.00

Audited and found correct,

(Signed) J. WALTON GROVES
W. C. BROADFOOT

June 10, 1948.

ABSTRACTS OF PAPERS PRESENTED AT THE FIFTEENTH ANNUAL MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

THE TYMPANIS SPECIES OCCURRING ON PINE

J. W. GROVES and A. MAVIS LEACH, Division of Botany and Plant Pathology, Central Experimental Farm, Ottawa.

The species of *Tympanis* occurring on coniferous hosts have been greatly confused in the literature. Thirteen species of fungi under Tympanis names have been reported as occurring on pine. It is considered that there are actually three species which can best be distinguished by the character of the primary ascospores. *T. hypopodia* Nyl. has fusiform, two-celled primary ascopores and is also distinct by reason of the small size of the asci. *T. pithya* Karst. has ellipsoid to subglobose, one or two-celled primary ascospores whereas *T. confusa* Nyl. has elongate-fusiform, several-septate primary ascospores. The size of the asci overlaps greatly in the latter two species, although the asci of *T. confusa* tend to be slightly smaller. *T. confusa* is the cause of the Tympanis canker of red pine.

IDENTIFICATION OF CULTURES OF WOOD-ROTTING FUNGI

MILDRED K. NOBLES, Division of Botany and Plant Pathology, Central Experimental Farm, Ottawa.

A numerical key for the identification of cultures of wood-rotting fungi is presented. Morphological and physiological characters shown by the fungi when grown, under standard conditions, on malt agar and malt agar containing gallic or tannic acids are used in diagnosis. The form of the key permits the interpolation of additional species. The identification of large numbers of cultures isolated during decay studies on various hosts has provided data on the incidence and economic importance of various fungus species and has demonstrated the pathogenicity of a number of species for the first time.

SOME FOLIAGE PARASITES OF TREES

D. B. O. SAVILE, Division of Botany and Plant Pathology, Ottawa, Ont.

Uncommon or otherwise interesting parasitic fungi studied recently include *Phleospora Aceris, Phyllosticta minima, Ramularia lethalis* and *Taphrina Dearnessii* on *Acer; Passalora bacilligera* on *Alnus; Gloeosporium Coryli* on *Corylus; Phomopsis juniperovora* on *Juniperus; Cylindrosporium Dearnessii* on *Ostrya; Gloeosporium nervisequum* and *Taphrina coerulescens* on *Quercus; Phleospora Ulmi* on *Ulmus;* and *Plasmopara Viburni* and *Puccinia Linkii* on *Viburnum.*

THE SIGNIFICANCE OF THE NORMAL FLORA ON WHEAT SEED IN INOCULATION STUDIES WITH HELMINTHOSPORIUM SATIVUM

R. J. LEDINGHAM, B. J. SALLANS, and P. M. SIMMONDS, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

Treatment of seed with formalin prior to inoculation with *H. sativum* results in increased lesioning as compared with untreated seed, particularly if the seedlings are grown in sterile soil or on other sterile media.

Numerous tests have demonstrated that the cause of the increased disease under such conditions is the removal of surface organisms, particularly bacteria, which would otherwise interfere with the development of the pathogen.

Different samples of wheat of a given variety may vary appreciably in the abundance of their surface flora. In inoculation tests to determine relative resistance to *H. sativum,* this variability of the seed flora results in corresponding variations in disease ratings. However, by proper surface disinfection of the seed prior to inoculation a truer measure of basic resistance of the variety is achieved. Likewise within any pure line more uniformity of results will be achieved.

The surface flora of wheat seed may be increased greatly by moistening the seed with water and allowing it to incubate for a period. Seed so treated will show more resistance to *H. sativum* in inoculation tests, particularly in Petri dishes or in sterile soil, than unincubated seed. Similar results may be achieved by applying a suitable bacterial suspension to the seed prior to inoculation. Greenhouse tests indicated reduced disease on seedlings grown for 10 days, even in unsterilized soil, in an inoculation test with *H. sativum* following bacterization of the seed.

TESTING WHEAT SEEDLINGS FOR RESISTANCE TO HELMINTHOSPORIUM SATIVUM, WITH REFERENCE TO ANTIBIOSIS

B. J. SALLANS, R. J. LEDINGHAM and P. M. SIMMONDS, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

The effectiveness of formaldehyde solutions in treating wheat seed prior to inoculation with *H. sativum* for the purpose of removing the bacterial flora can be increased by acidifying them with lactic acid. This makes possible a closer approximation to the inherent resistance of wheat varieties and lines to *H. sativum* by the more nearly complete removal of antibiotic influences of the bacteria on the fungus.

Using solutions containing varying proportions of formaldehyde and lactic acid to treat wheat seed, a significant negative correlation has been found between the proportion of seed carrying bacteria and the disease ratings following inoculation with *H. sativum* on seedlings produced from the seed.

A number of varieties were found to possess significantly greater resistance to *H. sativum* than the commonly grown varieties, using acidified formaldehyde solutions to reduce the antibiotic effects of seed-borne bacteria.

THE OCCURRENCE OF PUCCINIA CORONATA ON RHAMNUS FRANGULA IN CANADA

B. PETURSON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Heavy aecial infections of *Puccinia coronata* were found on *Rhamnus Frangula* at Fredericton, N.B., in 1939 and have occurred there each year since. This appears to be the first recorded occurrence of aecial infection on *R. Frangula* in North America. Abundant telia of a crown rust were found on a grass identified as *Agrostis* sp. which grew near the infected buckthorn bushes. This rust material was sent to the Dominion Laboratory of Plant Pathology, Winnipeg, Man., for further study.

In the tests made the aeciospores from *Rhamnus Frangula* failed to cause infection on cultivated oats but infected several species of *Agrostis*. Coronate teliospores formed on the infected *Agrostis* plants in the greenhouse. These teliospores, when used for the inoculation of *R. Frangula*, caused normal pycnia and aecia to form.

The teliospores found on *Agrostis* sp. at Fredericton germinated readily and caused heavy aecial infection on *Rhamnus Frangula*, but failed to infect *R. cathartica*.

The behaviour of this rust on the grass hosts tested shows it to be identical with a variety of crown rust which Ericksson isolated in Europe in 1897 and named *Puccinia coronata* Corda forma *Agrostis* Erikss.

Although the occurrence of *Puccinia coronata* var. *Agrostis* has not been reported on its aecial host anywhere in North America, except at Fredericton, N.B., it may occur in the uredial and telial stages on its grass hosts elsewhere in America. Three Canadian collections of crown rust on *Agrostis stolonifera* are now in the Mycological Herbarium at Ottawa. Crown rust has been recorded on several species of *Agrostis* in many localities in the United States. However, the exact identity of the variety or varieties of crown rust occurring on grass hosts cannot be established until the appropriate host inoculation tests have been carried out.

Since the aecial host of this rust, *Rhamnus Frangula,* as well as several of its uredial and telial hosts, *Agrostis* spp., are native European species it is probable that this rust has been introduced into North America from Europe.

INFLUENCE OF SAPROPHYTIC MICROORGANISMS ON THE SPORULATION OF OPHIOBOLUS GRAMINIS SACC.

F. R. DAVIES, A. W. HENRY, A. W. JACKSON, and J. D. GILPATRICK,
University of Alberta, Edmonton, Alta.

Under field conditions in Alberta, *Ophiobolus graminis,* the fungus causing take-all, sporulates occasionally, though not consistently, on the basal parts of its host plants near the soil surface. Cultures on artificial media usually fail to sporulate. The occurrence of an abundance of mature perithecia in a culture contaminated with a bacterium and another fungus, suggested that other microorganisms might stimulate fruiting in *Ophiobolus graminis.* The aforementioned bacterium (B_1) and fungus *(Cladosporium* sp.) together with three other fungi namely a Penicillium, an Aspergillus and an Alternaria were each grown in association with *O. graminis* but only the bacterium definitely stimulated sporulation. A sterile filtrate from a liquid nutrient culture of the bacterium appeared to lack the the ability to induce fruiting.

Four different strains of *O. graminis,* two of them originating from single ascospores, were induced to sporulate in artificial culture on potato dextrose agar by contaminating them with the bacterium B_1. The contaminated cultures did not sporulate during a month's growth in darkened incubators kept at temperatures from 10° — 25°C but all such cultures did sporulate after a month at room temperature during which time they were exposed to the light of the laboratory.

Ability to stimulate sporulation in artificial culture does not appear to be possessed by many individual microorganisms since a survey of more than 450 isolates of bacteria, fungi and actinomycetes from the soil, the basal parts of wheat plants and other sources failed to disclose this property in any of them.

The possibility that soil microorganisms may stimulate sporulation of *O. graminis* on the host plant was tested by growing inoculated wheat seedlings in sterilized and in unsterilized soil. In one experiment 96 per cent of the seedlings grown in unsterilized soil produced perithecia whereas only 8 per cent of the seedlings in sterilized soil produced them. The results suggest that the combined influence of several microorganisms on sporulation warrants further investigation.

In an attempt to determine the nature of the stimulating influence of other microorganisms on fruiting of *O. graminis,* preliminary studies were made with the vitamins biotin and thiamin on two strains of the pathogen. Biotin alone stimulated growth of both strains whereas thiamin alone did not, but thiamin in the presence of biotin stimulated growth and in the case of one strain, biotin and thiamin together induced the formation of bodies resembling immature perithecia.

APPLE SCAB CONTROL RELATION TO ITS EPIDEMIOLOGY

J. F. HOCKEY, Dominion Laboratory of Plant Pathology, Kentville, N.S.

Apple scab is one of the limiting factors to the economical production of apples in Canada. Primary infections are produced from ascospores liberated by the perithecia produced in overwintering leaves of the host. The development of perithecia takes place in normally abcissed leaves, but not in leaves which have been frozen on the trees. Temperature, rainfall and humidity influence the development of the fungus both in its saprophytic development and in its parasitic invasion of the host. Greatest fungus activity is between the temperatures of 60°F. to 75°F. Fungicides must be applied to the host before periods of ascospores infection occur. There is a definite need for eradicant fungicides which can be used up to three days after infection period without injury to the host. Some of the new organic fungicides show promise in this capacity. Bordeaux mixture 3-10-100 in the second or third cover spray has given good control of late scab and "storage scab" infections. A considerable reduction of viable perithecia has been obtained by ground sprays in the spring, but these do not take the place of any of the seasonal applications to the trees.

THREE YEARS' SPRAYING EXPERIMENTS FOR CONTROL OF APPLE SCAB IN THE NIAGARA PENINSULA

G. C. CHAMBERLAIN, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

The capabilities and limitations of thirty-four fungicidal treatments for control of apple scab have been investigated during the past three years at St. Catharines in the Niagara Peninsula. The results of these experiments presented along with pertinent phenological data have demonstrated the role of elemental sulphur fungicides in the present spray schedule, the importance of particle size in their effectiveness, of timeliness of application in respect to critical infection periods, the need of renewing coverage after periods of excessive weathering and the advisability of making application at intervals of 7 - 10 days, irrespective of bud development especially through the period from the pink bud stage to the first cover spray.

The addition of spreader-adhesives to the dry sulphurs has been found to improve scab control in wet weather.

Data thus far obtained in respect to the value of organic fungicides suggest that certain of these products may find special uses in the spray programme. Fermate and Phygon have proven promising fungicides while Isothan and polythylene polysulfide were found quite ineffective. Methasan and Dithane were found to cause conspicuous foliage injury. Agricultural Puratized performed well as an eradicant but appeared to lack protective value.

SOME OBSERVATIONS ON CHERRY VIROSES IN ONTARIO

R. S. WILLISON, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

In the early summer of 1947, 26 sweet cherry plantings, of various sizes and at widely scattered points in the Niagara fruit belt, were surveyed and mapped. In 24 of the blocks, the incidence of tatter leaf ranged from 0.6 to 41.3 per cent. There did not appear to be any consistent relationship between the frequency of occurrence of tatter leaf in an orchard and proximity to sour cherries. Mottling, with and without ring patterns, also occurred in most blocks. In eleven orchards, an average of 10 per cent of the trees had leaves with necrotic spottings of undetermined origin. Crinkle, a non-transmissible abnormality, was of relatively infrequent occurrence.

Cherry yellows was found in each of the 32 blocks of sour cherries surveyed, at incidences varying from 2.6 to 78.2 per cent. In some orchards, a number of trees diagnosed as yellows-infected in 1945 did not show symptoms in 1947. The "bare-wood", willowy branch effect, generally regarded as a symptom of long-standing yellows infections, was not always significantly correlated with the presence of foliage symptoms of the disease.

The known minimum incidence of necrotic ring spot varied from 0 to 73.7 per cent. The chronic symptoms of this disease are usually either suppressed or inconspicuous and easily obscured by spray residue. Severe acute or "shock" symptoms, indicative of new infections, were observed in fourteen orchards, in ten of which 0.3 to 3.8 per cent of the trees were affected. Such orchards and most of those showing only mild symptoms are considered, in the light of previous investigations, to have almost reached the saturation point. The four orchards in which 10.8 to 25.7 per cent of the trees displayed severe shock symptoms appear to be in the intermediate stages of invasion and to have substantial numbers of healthy trees.

LATE BLIGHT EPIDEMIOLOGY STUDIES IN PRINCE EDWARD ISLAND

L. C. CALLBECK, Dominion Laboratory of Plant Pathology, Charlottetown, P.E.I

Late blight of potato, *Phytophthora infestans*, is perennial in the tubers and primary field infections are initiated chiefly by wind-borne spores produced in cull or dump piles. Few examples of field infection resulting from the use of affected

seed pieces are reported in the literature. Recent observations in Florida indicate that viable spores may be carried 30 to 40 miles by the wind under favourable meteorological conditions. Outbreaks are coincident with more or less epecific weather conditions, and the number and duration of periods favourable to sporulation and germination determines the severity of attacks. The cumulative rainfall record for the growing season has not been a reliable guide for forecasting blight outbreaks in Prince Edward Island. Some seasons of abundant rain have remained blightless, while in certain other seasons of little rain severe epiphytotics have occurred. The frequency of the rains and the meteorological character of the intervals are the important factors in influencing sporulation and germination. Records show that in few seasons can spraying in Prince Edward Island be disregarded with impunity. Severe epidemics have occurred during 13 of the last 26 years, trace to mild infections have occurred during 9 years, while only 4 years have been blightless. Losses because of late blight tuber rot in storage are chiefly brought about by harvesting while vines are still green or too soon after their death.. The use of vine killers together with the practice of delaying digging until about two weeks after the plants have died removes the danger of loss through blight rot.

INVESTIGATIONS ON PHYTOPHTHERA INFESTANS WITH RESPECT TO TOMATO LATE BLIGHT

L. V. BUSCH, Ontario Agricultural College, Guelph, Ont.

An isolate of *Phytophthora infestans* obtained from diseased tomato plants proved to be highly virulent on Katahdin potatoes, both tops and tubers, under field conditions. Re-inoculation of tomato plants, using the diseased potato tubers as the source, indicated no loss in virulence on tomatoes. Abundant conidia developed from lesions on potato shoots grown from diseased tubers in the greenhouse, tomato plants were readily infected by using these conidia as a source of inoculum.

A varying degree of virulence was indicated when Bonny Best tomatoes were inoculated under greenhouse conditions, with isolates from potato tubers obtained from different counties in Ontario.

Of some 120 species and varieties of tomatos inoculated under greenhouse conditions with a virulent tomato isolate, only *Lycopersicon hirsutum* expressed a marked degree of resistance; three tomato varieties showed some resistance. *Solanum Dulcamara* is susceptible.

STUDIES ON THE BUNCH-TOP (PURPLE-TOP WILT) DISEASE OF POTATOES

D. J. MACLEOD, Dominion Laboratory of Plant Pathology, Fredericton, N.B.

In these studies it has been proven that the bunch-top (purple-top wilt) disease is caused by a virus. This virus behaves in certain respects like the aster yellows virus, Callistephus virus 1, but it is not identical with the type strain. All attempts to transmit this virus from infected potatoes to asters by means of *Macrosteles divisus,* the vector of the aster yellows virus, have been unsuccessful. The bunch-top virus was repeatedly transmitted by grafting from infected potato to potato, *Lycopersicon esculentum, Datura stramonium, Nicotiana rustica, N. glutinosa,* and *N. tabacum,* in all of which hosts it gave rise to characteristic symptoms. The virus was also transmitted by grafting from tomato to potato. The bunch-top virus invades the tubers of infected potatoes and causes a softening, and later a hardening, of the tuber. Infected eyes usually germinate slowly, sometimes failing to germinate until two years have elapsed. The virus rarely invades the plants produced from infected tubers. When such plants are invaded, however, the symptoms produced are similar to those described for the disease known as haywire. When the bunch-top virus was combined with the leaf roll virus in Green Mountain a vascular necrosis was produced at the stem-end of the tuber resembling net necrosis. This vascular necrosis also showed the fluorescence in ultra-violet light usually

associated with the net necrosis believed to be produced by leaf roll. A type of purple-top was also found which was attributed to mechanical injury to the roots and stems of certain varieties of potatoes.

THE EFFECT OF THE INCORPORATION OF CERTAIN COVER CROPS ON THE MICROFLORA OF POTATO-SCAB-INFESTED SOIL

R. G. ATKINSON and J. W. ROUATT, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

The incorporation of crops of soybeans, rye and clover into potato-scab-infested soil in the greenhouse resulted in quantitative and qualitative changes in the soil's microflora. Soybean stimulated microbial activity to the greatest extent and caused appreciable qualitative changes in the fungus and bacterial flora. Examination of tubers of potatoes subsequently grown in these soils and a control showed a marked reduction in scab in the soybean treated soil. Associated with this reduction in scab was a shift in the pH of the soil to a more acid level and a striking reduction in numbers of actinomycetes on the tubers.

SPECIALIZATION IN PARASITISM IN CLADOSPORIUM FULVUM COOKE

D. L. BAILEY, University of Toronto, Toronto, Ont.

Six races of *Cladosporium fulvum* have been differentiated on the basis of differential reactions of Stirling Castle, Vetomold, V-121, V-473 and the Vineland strain of Red Currant. Under green-house conditions two additional strains of Red Currant as well as *Lycopersicon hirsutum* and *L. hirsutum* var. *glabratum* have thus far been immune. Surveys of *Cladosporium fulvum* races during the last ten years have indicated a stable condition where only susceptible host varieties were grown. The introduction of Vetomold, V-121 and V-473, however, was followed in each case by the development of a new race, presumably by mutation, capable of infecting each in turn but otherwise similar to and as constant as the race from which they were apparently derived.

CONTROL OF GLADIOLUS DISEASES

S. A. SIMMONS, Ontario Agricultural College, Guelph, Ont.

A high percentage of disease-free corms was harvested from plantings grown from corms 100 per cent affected by *Sclerotinia Gladioli* Drayt. Only one treatment reduced the incidence of dry rot to a level lower than in the dry check.

Incidence of dry rot, core rot, and scab was markedly lower on sandy loam than on clay loam.

Foliage sprays so far used show no promise in control of either dry rot or core rot.

Pre-harvest drip treatments show sufficient promise in control of core rot and dry rot to warrant further investigation.

SOIL TREATMENT WITH ARASAN IN THE CONTROL OF CERTAIN SEEDLING DISEASES OF VEGETABLES

C. D. McKEEN, Dominion Laboratory of Plant Pathology, Harrow, Ontario.

Preliminary results have shown that Arasan (50 per cent tetramethyl thiuramdisulphide), when used as a soil treatment, has given considerable protection against certain vegetable seedling diseases. Soil treatment with this fungicide has reduced the incidence of onion smut *(Urocystis Cepulae)* to less than 1 per cent, while 47 per cent of the seedlings in non-treated soil were infected.

Under conditions of temperature and moisture favourable to damping-off, as caused by *Pythium ultimum* and *Rhizoctonia Solani*, soil treatment with Arasan has proved to be very effective in controlling this disease in peppers, tomatoes and spinach. A combined soil and seed treatment has given the greatest protection

against damping-off in all vegetables tested. The most striking effect of soil treatment against damping-off has been found in the high degree of protection offered against the post-emergence phase of the disease.

SOIL TREATMENT WITH ARASAN FOR THE CONTROL OF BLACKROOT OF SUGAR BEET SEEDLINGS

A. A. HILDEBRAND, Dominion Laboratory of Plant Pathology, Harrow, Ont.

In an extensive series of greenhouse experiments carried out at Harrow under ordinary as well as controlled environmental conditions, to test the efficacy of applications of a number of the newer organic fungicides to the upper zones of naturally-infected field soil, consistently favourable results have been obtained with Arasan, an application of this chemical at 3 to 4 pounds par acre (calculated on a linear-foot basis) having reduced the mortality of seedlings to less than 5 per cent, as compared with losses usually exceeding 40 per cent in non-treated soil. Arasan is compatible with commercial fertilizers; thus, for convenience and in conformity with field practice, the two may be applied as a mixture in the rows at time of seeding. Arasan is known to remain highly effiective in the soil for periods of 5 weeks or more. In preliminary co-operative tests under actual field practice, Arasan was found to be effective in reducing the incidence of the disease. In one test, for example, the stand of surviving seedlings in Arasan-treated rows exceeded that in non-treated rows by 3.4 to 1.

SWEET CLOVER FAILURE IN SOUTHWESTERN ONTARIO

JOHN T. SLYKHUIS, Dominion Laboratory of Plant Pathology, Harrow, Ont.

Although biennial sweet clovers *(Melilotus alba* and *M. officinalis)* are valued highly as soil improving and forage crops in Essex and Kent counties, Ontario, many farmers are discontinuing their culture because of increasing difficulty in obtaining productive stands. In some fields "sweet clover failure" becomes evident as thin stands and poor growth during the first summer after sowing. In several such fields observed in 1947, failure was correlated with an unusually low calcium and high acid condition of the soils. Most instances of failure, however, did not become evident until after growth had resumed the following spring, when a destructive root rot was found to be quite widespread, having killed as many as 75 to 90 per cent of the plants in a number of fields observed. In nearly every case *Phytophthora* has been found associated with the root rot.

Twenty-two varieties of sweet clover belonging to five species, are being compared for resistance to this root rot, and further studies are being made to extend knowledge of all factors that may contribute to sweet clover failure in Ontario.

THE EFFECT OF DDT AND 2, 4-D ON SOME DISEASES OF FLAX

W. E. SACKSTON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Shortly after the discovery by Johnson (Can. Jour. Res. C, 21:23-25, 1946) that DDT reduced the resistance of Khapli wheat to stem rust, greenhouse experiments were made to determine the effect of spraying with DDT on the reaction of flax to pasmo. Initial inoculations with the pasmo organism were made on 12 flax varieties used as rust differentials. Half of the plants in the experiment were sprayed with DDT and half with the same solution without DDT, using Johnson's formulation, two days after inoculation with pasmo. No effect attributable to DDT was observed on any of them. Subsequent inoculations were made on Viking flax under various environmental conditions, but in no case were the symptoms affected by treating the plants with DDT.

During the summer of 1947, a field-plot experiment was performed in co-operation with Mr. J. S. Skaptason to study the effect on pasmo and rust of treating flax plants with 2, 4-D. The flax varieties used were Royal, Redwing, Bison, Rocket, Dakota, Sheyenne, Crystal and Viking. The 2, 4-D was applied at the rates of 0, 2, and 4 ounces of acid per acre. One-third of the plots were left uninoculated,

one-third were inoculated with pasmo *(Septoria linicola)*, and one-third were inoculated with rust *(Melampsora Lini)* six days after the 2, 4-D applications. Moderate 2, 4-D injury was observed when final notes were taken on the experiment three weeks later. Typical pasmo symptoms were seen in all the pasmo-inoculated plots, and normal rust infection was present on all the rust-inoculated susceptible varieties, but not on the varieties immune to rust. 2, 4-D had no apparent effect on the reactions of the flax varieties used on the diseases studied.

In March of 1948 plants of Bison flax unintentionally exposed to the fumes of 2, 4-D in the greenhouse were made available by Mr. B. Peturson. The stems of the six-weeks old plants were twisted and some of the upper leaves were enlarged and fused. Inoculations were made with pasmo, rust, anthracnose *(Colletotrichum Lini)* and stembreak *(Polyspora Lini)*. A few spores of the respective pathogenes were placed on the distorted leaves and on the apparently unaffected cotyledons of the test plants and on leaves of normal plants of the same variety. Additional inoculations were made with stembreak by stabbing the leaves with a needle covered with spores of the pathogen. Symptoms developed with equal intensity on the distorted and normal leaves inoculated with pasmo, rust and anthracnose. No infection resulted on any of the plants inoculated with *P. Lini*. The 2, 4-D did not seem to affect the reaction of Bison flax to any of the pathogens studied.

FURTHER NOTES ON THE MAINTENANCE OF FUNGUS CULTURES IN SOIL

J. J. MILLER, McMaster University, Hamilton, Ont.

Certain cultures of the muskmelon wilt Fusarium were found to be still viable after 5 years in test-tubes containing sterilized soil. These showed no change in cultural characteristics, or loss of pathogenicity when compared with recent isolates. The rate at which the viability of the organism declined in dry soil was assessed by means of the dilution plate technique. Data concerning the viability under similar conditions of other soil fungi are also presented.

THE HELMINTHOSPORIUM BLIGHT OF OATS IN ONTARIO

W. C. BROADFOOT, Division of Botany and Plant Pathology, Ottawa, Ont.

Helminthosporium victoriae, causing a root rot and leaf blight of oat varieties having Victoria as a parent and possessing its type of resistance to crown rust *(Puccinia coronata)*, was found in June, 1947, at Ottawa on the two new Canadian varieties, Beacon and Garry. Later it was found in several districts in Ontario. Since then, it has been reported from all provinces in Canada except Alberta. It has also been isolated from the soil at Merrickvale, Ontario, in which susceptible varieties were grown. *H. victoriae* was isolated from seed produced at Ottawa in 1945, 1946, and 1947, but not in the seed grown in 1944. Of the 14 different fungicides tested on naturally infected seed of Beacon oats, only the organic-mercury compounds Ceresan, Panogen, and R 118A controlled the seed-borne phase of this disease. The Leytosan treatment reduced but did not control this seed-borne pathogen. The length of time elapsing between treatment and plating and/or planting did not appear to increase or decrease the effectiveness of the fungicides that controlled the disease. None of the seed treatments controlled the soil-borne phase of this disease. In studies on the development of this blight in constant soil temperature tanks, the results indicated that the disease developed more at the high than at the low temperatures. Seed treatment with Ceresan at the rates of ¼, ½, and ¾ ounce reduced the seed-borne phase of the disease but did not control it, especially at the higher temperatures.

LIST OF PAPERS

PUBLISHED BY MEMBERS OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

Between June 1, 1946, and May 31, 1948.

(in addition to abstracts published in Proc. Can. Phytopath. Soc. Vols. 14 and 15, 1946 and 1947).

1. BERKELEY, G. H. Cherry yellows and necrotic ring spot of sour cherries. The value of *Prunus persica* and *P. domestica* versus Italian prune as index hosts. Phytopath. 37:2. 1947 (Abstract).
2. ———— A strain of alfalfa mosaic virus on pepper in Ontario. Phytopath. 37:781-789. 1947.
3. ———— Recent data on protection of potatoes. Proc. Potato Sect. Ont. Crop Improvement Assoc. 1948:29-33. 1948.
4. BIER, J. E. The relation of research in forest pathology to the preparation of forest inventories. II The significance of brown pocket in Sitka spruce on the Queen Charlotte Islands, B.C. Lumberman 30:54-55. 1946.
5. ———— and D. C. BUCKLAND. Relation of research in forest pathology to the management of second growth forests. I. *Poria Weirii* root rot, an important disease affecting immature stands of Douglas fir. B.C. Lumberman 31:49-66. 1947.
6. ———— and R. E. FOSTER. The relation of research in forest pathology to the preparation of forest inventories. I. The possibility of obtaining net volumes by grade when cruising overmature stands of Sitka spruce on the Queen Charlotte Islands. B.C. Lumberman 30:52-54. 1946.
7. ———— and P. J. SALISBURY. Studies in forest pathology. IV. Decay of Sitka spruce on the Queen Charlotte Islands. Can. Dept. Agr. Tech. Bull. 56 (Publ. 783). 1946.
8. ———— and MILDRED K. NOBLES. Brown pocket of Sitka spruce. Can. Jour. Res. C. 24:115-120. 1946.
9. BLACK, L. M. Plant tumours induced by the combined action of wounds and virus. Nature 158:56. 1946.
10. ———— Variation in host susceptibility to wound-tumour disease. Amer. Jour. Bot. suppl. 33:13a. 1946. (Abstract).
11. ———— Virus tumours in plants. Growth supplement. Sixth Growth Symposium: 79-84. 1947.
12. ———— Transmission of clover club leaf virus through the egg of its insect vector. Phytopath. 38:2. 1948. (Abstract).
13. ———— Histology of a virus tumour in plants. Amer. Jour. Bot. suppl. 34:7a. 1947. (Abstract).
14. ————, V. M. MOSLEY and R. W. G. WYCKOFF. Electron microscopy of potato yellow-dwarf virus. Biochem. Biophys. Acta 2:121-123. 1948.
15. ———— and P. W. OMAN. Parthenogenesis in a leafhopper, *Agallia quadripunctata* (Provencher). (Homoptera: Cicadellidae). Proc. Ent. Soc. Washington 49:19-20. 1947.
16. BOSHER, J. E. and W. NEWTON. A new method of hyacinth propagation involving additional wounding, the use of fungicidal dusts and a growth promoting substance. Sci. Agr. 28:26-29. 1948.
17. ———— The control of *Penicillium* spp. on tulip and iris bulbs in storage by fungical dusts. Sci. Agr. 28:47-48. 1948.
18. BROADFOOT, W. C. Treating snow-mould. Roy. Can. Golf Assoc. Ann. Rev. 1947.
19. ———— Seed-borne diseases and their control. Proc. Ont. Crop Improvement Assoc. 1948:99-101. 1948.
20. ———— The control of smuts in cereals. Can. Seed Growers' Assoc. Ann. Rept. 1946-47:22-25. 1948.
21. ———— The new Helminthosporium leaf blight of oats in Ontario. Sci. Agr. 27:446-447. 1947. (D. G. Hamilton and W. C. Broadfoot).
22. BROWN, A. M. A homothallic short-cycle strain of *Uromyces Polygoni* (Pers.) Fuckel. Can. Jour. Res. C, 26:140-142. 1948.
———— (See also 88).

23. BUCKLAND, D. C. Investigations of decay in western red cedar in British Columbia. Can. Jour. Res. C, 24:158-181. 1946.
———— (See also 5).
24. CALLBECK, L. C. Killing potato vines with chemicals. Proc. Potato Sect. Ont. Crop Improvement Assoc. 1497:11-20. 1947.
25. ———— A progress report on studies of the effects of varying the proportion of lime in Bordeaux mixture for potato spraying. Amer. Potato Jour. 24:377-381. 1947.
26. CAMPAGNA, E. et al. Manuel d'Agriculture par les Professeurs de l'Ecole Supérieure d'Agriculture. Tome 1. Les Champs. 2ième édition, revisée et augmentée. Ste Anne de la Pocatière. 1947.
27. CHEREWICK, W. J. A method of establishing rust epidemics in experimental plots. Sci. Agr. 26:11. 1946.
28. ———— Relation between spore load on the seed and amount of smut infection in cereal grains. Phytopath. 38:4. 1948. (Abstract).
29. ———— Two important diseases of alfalfa in Manitoba. Phytopath. 38:5. 1948. (Abstract).
———— (See also 95).
30. CONNERS, I. L. and D. B. O. SAVILE. Twenty-fifth Ann. Rept. of the Canadian Plant Disease Survey (1945). Ottawa 1946.
31. ———— Twenty-sixth Ann. Report of the Canadian Plant Disease Survey (1946). Ottawa. 1947.
32. CORMACK, M. W. *Sclerotinia sativa* and related species as root parasites of alfalfa and sweet clover in Alberta. Sci. Agr. 26:448-459. 1946.
33. ———— Winter crown rot or snow mould of alfalfa, clover, and grasses in Alberta. I. Occurrence, parasitism, and spread of the pathogen. Can. Jour. Res. C, 26:71-85. 1948.
34. CRAIGIE, J. H. Disease prevention in field crops. Can. Seed Growers Assoc. Ann. Rept. 1946-47:14-17. 1947.
35. FOLSOM, D. Potatoes: leafroll including net necrosis — resistant varieties, Highmood Farm test: comparison of Highmoor Farm leafroll-resistant seedlings on Aroostook Farm. Breeding disease resistant beans. Breeding scab resistant cucumbers. Effect of adding epsom salts on the efficiency of apple scab sprays. Apple spraying with new fungicides. In: Report of progress for year 1945. Maine Agr. Exp. Sta. Bull. 442:122-123, 220-221, 269-270, 273-274. 1946.
36. ———— Resistance of potato seedling varieties to the natural spread of leaf roll. Amer. Potato Jour. 23:247-264. 1946.
37. ———— Potato yellow top and unmottled curly-dwarf in Maine. Maine Agr. Exp. Sta. Bull. 446. 1946.
38. ———— Potatoes: breeding for leafroll resistance, Highmoor Farm; net necrosis and stem-end browning in storage at different temperatures. Breeding disease resistant beans. In: Report of progress for year 1946. Maine Agr. Exp. Sta. Bull. 449:282-283, 299-301, 380-381. 1947.
39. ———— Inheritance of predisposition of potato varieties to internal mahogany browning of the tubers. Amer. Potato Jour. 24:294-298. 1947.
40. ———— Permanence of greening of potato tubers. Amer. Potato Jour. 24:336-340. 1947.
41. ———— A ten-year apple spray test. Maine State Pom. Soc. Ann. Rept. 1947: 36-37. 1947.
FOSTER, R. E. (See 6 and 7).
42. FOSTER, W. R. Cereal smuts. B.C. Dept. Agr. Field Crop Circ. 10:1-14. 1946.
43. ———— Diseases of fruit trees. B.C. Dept. Agr. Hort. Circ. 73:1-61. 1947.
44. ———— Potato diseases. B.C. Field Crop Cir. 15:1-44. 1948.
45. ———— and T. B. LOTT. "Little Cherry", a virus disease. Sci. Agr. 27:1-6. 1947.
46. GOOD, H. M. Studies on the Cladosporium blight of sweet pea. Can. Jour. Res, C, 25:137-154. 1947.
47. GOODMAN, J. J. and A. W. HENRY. Action of subtilin in reducing infection by a seed-borne pathogen. Science 105:320-321. 1947.
48. GROVES, J. W. North American species of Dermea. Mycol. 38:351-431. 1946.
49. ———— *Pezizicula Morthieri* on Rhamnus. Mycol. 39:328-333. 1947.

50. ———— and A. J. SKOLKO. Notes on seed-borne fungi. IV. Acremoniella, Chladomyces and Trichocladium. Can. Jour. Res. C, 24:74-80. 1946.
51. HAGBORG, W. A. F. Investigations on grey speck of oats in Manitoba. Phytopath. 37:8. 1947. (Abstract).
52. ———— and R. F. PETERSON. A plot inoculation method for determining the resistance of wheat varieties to bacterial black chaff. Phytopath. 37:8. 1947. (Abstract).
53. HENRY, A. W. The potato crop in Alberta. Univ. Alberta Bull. 46. 1946.
54. ———— Review of: *Root Disease Fungi* by S. D. Garrett. Phytopath. 37: 254. 1947.
55. ———— Treatment of vegetable seeds. Univ. Alberta Circ. 26. 1948.
———— (See also 47).
56. HILDEBRAND, A. A. The efficacy of soil application of fungicides for the control of black root of sugar beet seedlings. Proc. Amer. Soc. Sugar Beet Technologists (Fourth Regional Meeting):28-30. 1947.
57. ———— and L. W. KOCH. Soybean diseases in Ontario and effectiveness of seed treatment. Phytopath. 39: 111-124. 1947.
58. ———— Observations on bud blight of soybeans in Ontario. Sci. Agr. 27:314-321. 1947.
———— (See also 93 and 94).
59. HOCKEY, J. F. Recent developments in disease control. 84th Report Nova Scotia Fruit Growers' Assoc.:59-65. 1947.
60. HOWITT, J. E. Rid Ontario of the common barberry and the European buckthorn. Ont. Dept. Agr. Ext. Circ. 49. Revised 1948.
61. JACKSON, H. S. Trichomonascus, a new genus among simple Ascomycetes. Mycol. 39:709-715. 1947.
62. ———— Studies of Canadian Thelephoraceae I. Some new species of Peniophora. Can. Jour. Res. C, 26:128-139. 1948.
63. ———— Studies of Canadian Thelephoraceae, II. Some new species of Corticium. Can. Jour. Res. C, 26:143-157. 1948.
64. ———— and E. R. DEARDEN. *Martensella Corticii* Thaxter and its distribution. Mycol. 40:168-176. 1948.
65. JACQUES, J. E. Note préliminaire sur quelques substances antiproténém iques. Ann. Acfas 12:74-75. 1947.
66. ———— Le mulot et ses méfaits. Rap. Soc. Québec Prot. Pl. 1943-44. 29: 45-54. 1946.
67. ———— Les cavités des arbres. Le Réveil Horticole 3:25-27. 1947.
68. ———— Quelques champignons du lac Mistassini. Ann. Acfas 13:87. 1947.
69. JOHNSON, T. Variation and the inheritance of certain characters in rust fungi. *In:* Cold Spring Harbor Symposia on Quantitative Biology Vol. II. 1926.
70. ———— A form of *Leptosphaeria avenaria* on wheat in Canada. Can. Jour. Res. C, 25:259-270. 1947.
71. ———— and MARGARET NEWTON. Specialization, hybridization, and mutation in the cereal rusts. Bot. Rev. 12:337-392. 1946.
72. ———— The occurrence of new strains of *Puccinia triticina* in Canada and their bearing on varietal reaction. Sci. Agr. 26:468-478. 1946.
KOCK, L. W. (See 57, 58, 93, and 94).
73. LACHANCE, R. O. Quelques considérations sur l'arrosage des tomates. Agriculture 3:229-234. 1946.
74. LANGFORD, A. N. Autogeneous necrosis in tomatoes immune from *Cladosporium fulvum* Cooke. Can. Jour. Res. C, 26:35-64. 1948.
75. LEDINGHAM, G. A. Production and properties of 2, 3 - butanediol: XVII. Fermentation of glucose by strains of *Bacillus subtilis*. Can. Jour. Res. B, 25:56-64. 1947. (With A. C. Blackwood and A. C. Neish).
76. ———— Production and properties of 2, 3 - butanediol: XVIII. Dissimilation of glucose by *Serratia marcescens*. Can. Jour. Res. B, 25:65-69. 1947. (With A. C. Blackwood).
77. ———— Production and properties of 2, 3 - butanediol: XX. Influence of the inoculum on the *Aerobacillus polymyxa* fermentation. Can. Jour. Res. B, 25:180-191. 1947. (With A. C. Blackwood).

78. ———— Production and properties of 2, 3-butanediol: XXV. Dissimilation of glucose by bacteria of the genus *Serratia*. Can. Jour. Res. B, 26:335-342. 1948. (With A. C. Neish, A. C. Blackwood and Florence M. Robertson).
79. LEDINGHAM, R. J. The effect of seed treatment and dates of seeding on the emergence and yield of peas. Sci. Agr. 26:248-257. 1946.
80. LOTT, T. B. "Small bitter cherry", a fruit abnormality of the Bing cherry variety. Sci. Agr. 27:260-262. 1947.
———— (See also 45).
81. McCALLUM, A. W. The occurrence of Dutch elm disease in Canada. For. Chron. 22:203-209. 1946.
82. McKEEN, C. D. Late blight of tomato in Ontario. Can. Grower 70:8. 1947.
83. ———— An occurrence of soft rot in peppers and its relation to the corn borer. Sci. Agr. 28:142-143. 1948.
84. MacLACHLAN, J. D. and W. F. STRONG. Spraying and dusting turnips to prevent water core, a disorder caused by boron deficiency. Sci. Agr. 28:61-65. 1948.
85. McLARTY, H. R. While boron has added millions of dollars to tree fruit revenue, unsubdued diseases offer threats on which research is centered. Country Life in B.C. 30:8. 1946.
86. MACHACEK, J. E. Controlling disease in vegetable crops. Can. Hort. & Home 69:177. 1946.
87. ———— Lime-induced chlorosis. Can. Hort. & Home 69:181-182. 1946.
88. ———— and A. M. BROWN. Experiments in vegetable seed disinfection and observations on varietal resistance of beans, peas, and sweet corn to some diseases in Manitoba. Sci. Agr. 28:145-153. 1948.
89. MASSEY, L. M. Soil fumigants for root-knot control. Amer. Rose Ann. 32: 119-124. 1947.
90. ———— Understanding powdery mildew. Amer. Rose Ann. 33:137-145. 1948.
91. MILLER, J. J. Cultural and taxonomic studies of certain Fusaria. I. Mutation in culture. Can. Jour. Res. C, 24:188-212. 1946.
92. ———— Cultural and taxonomic studies of certain Fusaria. II. The taxonomic problem in Fusarium with particular reference to section Elegans. Can. Jour. Res. C, 24:213-223. 1946.
93. ————, L. W. KOCH, and A. A. HILDEBRAND. A comparison of cultural methods for the maintenance of certain economic fungi. Sci. Agr. 27:74-80. 1947.
94. ————, A. A. HILDEBRAND, and L. W. KOCH, Macrophomina and Fusarium attacking field beans in Ontario. Sci. Agr. 27:251-259. 1947.
95. NEWTON, MARGARET and W. J. CHEREWICK. *Erysiphe graminis* in Canada. Can. Jour. Res. C, 25:73-93. 1947.
———— (See also 71, 72 and 97).
NEWTON, W. (See 16 and 17).
NOBLES, MILDRED K. (See 8).
96. PERRAULT, C. L'antagonisme de certains micro-organismes envers *Corynebacterium sepedonicum*. Can. Jour. Res. C, 25:185-188. 1947.
97. PETURSON, B., MARGARET NEWTON, and A. G. O. WHITESIDE. Further studies on the effect of leaf rust on the yield, grade, and quality of wheat. Can. Jour. Res. C, 26:65-70. 1948.
98. POMERLEAU, R. Rapport général des travaux effectués sur la maladie hollandaise de l'orme dans la province de Québec en 1945. Que. Forestry Service Mimeo. Rept. 1946.
99. ———— Rapport général des travaux effectués sur la maladie hollandaise de l'orme dans la province de Québec en 1946. Que. Forestry Service Mimeo. Rept. 1947.
100. ———— Means of inoculation of the Dutch elm disease by *Hylurgopinus rufipes Eichh.* Can. Jour. Res. C, 25:102-104. 1947.
101. ———— Etude de l'effet antibiotique d'une bactérie sur le développement du *Ceratostomella Ulmi* (Schwarz) Buisman. Rev. Can. Biol. 6:478-483. 1947.
102. ———— Inventaire pathologique de la forêt décidue à la Station forestière expérimentale de Duchesnay (Québec). Que. Soc. Plant Protection Ann. Rept. 29. 1947.

103. POPP, W. A rapid method of examining wheat heads for bunt infection Phytopath. 37:418-420. 1947.
104. RICHARDSON, J. K. Tests with potato vine killers in Ontario. Proc. Potato Section Ont. Crop Improvement Assoc. 1947:21-23. 1947.
105. RICHARDSON, L. T. and R. E. GOODIN. Five years of bacterial ring rot in Ontario. Proc. Potato Section Ont. Crop Improvement Assoc. 1948:25-28. 1948.
106. RILEY, C. G. Heart rot of oaks caused by *Polyporus obtusus*. Can. Jour. Res. C, 25:181-184. 1947.
107. RUSSELL, R. C. Testing seed for smut spores as an aid in controlling cereal smuts in Saskatchewan. Sci. Agr. 26:372-380. 1946.
108. SACKSTON, W. E. Flax diseases in Manitoba in 1945. Can. Pl. Dis. Survey 25:32-35. 1946.
109. ———— Incidence of pasmo disease in relation to reduction of yields of flax. Proc. Flax Inst. U.S.A. 1946. (Abstract).
110. ———— Pasmo of flax. Seedtime and Harvest 179. 1947.
111. ———— Pasmo in Western Canada. Proc. Flax Inst. U.S.A. 1947.
112. ———— Flax diseases. 1. Pasmo. . Seedling blight. Proc. Ann. Conf. Man. Agrom. 1947:19-20. 1947.
113. ———— Pasmo in Western Canada. Flax Facts 12:1-2. 1948.
SALISBURY, P. J. (See 7).
114. SALLANS, B. J. Interrelations of common root rot and other factors with wheat yields in Saskatchewan. Sci. Agr. 28:6-20. 1948.
115. SANFORD, G. B. Effect of various soil supplements on the virulence and persistence of *Rhizoctonia Solani*. Sci. Agr. 27:533-544. 1947.
116. ———— The occurrence of bacteria in normal potato plants and legumes. Sci. Agr. 28:21-25. 1948.
117. SAVILE, D. B. O. A rapid freehand sectioning method for leaves. Stain Techn. 21:99-102. 1946.
118. ———— A new species of *Stagonospora* on *Ambrosia*. Mycol. 38:453-454. 1946.
119. ———— *Entyloma fuscum* and related smuts attacking Papaveraceae. Can. Jour. Res. C,24:109-114. 1946.
120. ———— A study of the species of *Entyloma* on North American Composites. Can. Jour. Res. C, 25:105-120. 1947.
———— (See also 30 and 31).
121. SIMMONDS, P.M. The influence of antibiosis in the pathenogenicity of *Helminthosporium sativum*. Sci. Agr. 27:625-633. 1947.
122. SIMMONS, S. A. Insects and diseases of house plants. Your Garden and Home. 2:10-11. 1948. (H. W. Goble and S. A. Simmons).
123. SKOLKO, A. J. Deterioration of fire-killed pulpwood stands in Eastern Canada, For. Chron. 23:128. 1947.
———— (See 50).
124. SLYKHUIS, J. T. Studies of *Fusarium culmorum* blight of crested wheat and brome grass seedlings. Can. Jour. Res. C, 25:155-180. 1947.
125. STAKMAN, E.C. Plant pathologist's merry-go-round. Jour. of Heredity 37:259-265. 1946.
126. ———— Fungi — friends and foes. *In:* The Scientists Speak. pp.196-199. Boni and Gaer, New York. 1947.
127. ———— International problems in plant disease control. Proc. Amer. Philosoph. Soc. 91:95-111. 1947.
128. ———— The nature and importance of physiologic specialization in phytopathogenic fungi. Science 105:627-632. 1947.
129. ———— Plant diseases are shifty enemies. Amer. Scientist 35:321-348. 1947.
130. ———— Plant diseases are shifty enemies. *In:* Science in Progress, Yale Univ. Press, 5th Ser: 235-279. 1947.
131. ———— Review of *Pflanzliche Infektionslehre* by Ernst Gaümann. Archives of Biochem. 12:304-306. 1947.
132. ———— Review of *Pflanzliche Infektionslehre* by Ernst. Gaümann. Phytopath. 37:684-685. 1947.
133. ———— Flag smut of wheat in Mexico. Phytopath. 36:479. 1946. (Abstract). (N. E. Borlaug, J. G. Harrar, and E. C. Stakman).

134. ———— Variation in phytogathogenic fungi. Am. Rev. Microbiol. 1:61-87. 1947. (C. M. Christensen, E. C. Stakman, and J. J. Christensen).
135. ———— Recent changes in the stem rust situation in Mexico. Phytopath. 36:400. 1946. (Abstract). (J. G. Harrar, W. Q. Loegering and E. C. Stakman).
136. ———— and W. Q. LOEGERING. The relation of barberries to physiologic races of *Puccinia graminis* in the United States in recent years. Phytopath. 38:24. 1948. (Abstract).
137. ————, F. V. STEVENSON, and C. T. WILSON. Adaptation of monosporidial lines of *Ustilago Zeae* to arsenic. Phytopath. 36:411. 1946. (Abstract).
138. THOMPSON, G. Watermelon seed treatments. Georgia Acad. Sci. Bull. 6:21. 1948. (Abstract).
139. ———— and G. SOWELL. Cultural variations in the fungus *Glomerella lagenarium* (Pass.) Stevens. Georgia Acad. Sci. Bull. 6:21. 1948. (Abstract).
140. TYNER, L. E. Studies on ring rot of potatoes caused by *Corynebacterium sepedonicum*. Sci. Agr. 27:81-85. 1947.
141. ———— Effect of crop debris, plant roots, and crop sequence on the microbial flora of the soil in relation to root rot in cereal crops. Can. Jour. Res. C, 26:86-93. 1948.
142. WILTSHIRE, S. P. Species of Alternaria on Brassicae. Commonwealth Mycol. Ins. Mycol. Paper 20:1-15. 1947.
143. VANTERPOOL, T. C. Flax diseases in Saskatchewan in 1946. Can. Pl. Dis. Survey 26:23-25. 1947.
144. ———— A seedling blight and leaf spot of flax caused by *Coniothyrium olivaceum* Bon. Can. Jour. Res. C, 25:54-58. 1947.
145. ———— Flax diseases. Univ. Sask. Agr. Ext. Bull. 110:1-6. 1947.
146. ———— *Selenophoma linicola* sp. nov. on flax in Saskatchewan. Mycol. 39:341-348. 1947.
147. ———— *Ditylenchus radicicola* (Greeff) Filipjev, a rootgall nematode new to Canada, found on wheat and other Gramineae. Sci. Agr. 28:200-205. 1948.
148. WRIGHT, N. S. A Stemphylium leaf spot on potatoes in British Columbia. Sci. Agr. 27:130-135. 1947.
149. YARWOOD, C. E. Water loss from fungus cultures. Amer. Jour. Bot. 34:514-520. 1947.
150. ———— The fungicidal value of mixtures of lime sulphur and zinc sulphate. Phytopath. 37:852-853. 1947.